characteristic of 2g/A of the loudspeaker) the buffer A3 has an amplification of -4, and the buffer A4 has an amplification of -1. So in the end the signal at the output of A5 has a sensitivity of 2V/g. All values are given just as example values.

While the present invention has been described in connection with particular embodiments thereof, it will be understood by those skilled in the art that many changes and modifications may be made without departing from the true spirit and scope of the present invention. In particular different control topologies, different types of filters, sensors and amplifiers may be used. Therefore, it is intended by the appended claims to cover all such changes and modifications which come within the true spirit and scope of this invention as given in the above description.

What is claimed is:

1.) An electrodynamic transducer system with a motional feedback closed-loop control system for motion control of the transducers membrane, comprising

a) an electrodynamic transducer comprising a membrane and at least one voice-coil attached to the membrane,

b) motion sensing means for measuring the motion of said membrane and producing motion signals indicative of said motion,

c) current sensing means for measuring the currents flowing through said voice-coils and producing current signals indicative of said currents,

d) control means of the closed-loop type, receiving said motion signals and receiving said current signals, for controlling the motion of said membrane in accordance to at least one received setpoint signal by using said motion signals predominantly to control the spectral lower-frequency components of said membrane's motion and by using said current signals predominatly to control the spectral higher-frequency components of said membrane's motion, and for producing at least one steering signal,

e) amplifying means receiving said steering signals from said control means and for driving electrical currents through said voice-coils in reaction to said steering signals,

whereby by using said current signals and said motion signals said membrane's motion is controlled by said control means over a wide frequency range in accordance to said setpoint signals.

2.) System according to claim 1, further comprising

a) first filtering means receiving said motion signals for lowpass - filtering said motion signals generated by said motion sensing means and producing filtered motion signals, which are conveyed to said controlling means,

b) second filtering means receiving said current signals for highpass - filtering said current signals generated by said current sensing means and producing filtered current signals, which are conveyed to said controlling means,

wherein said control means use said filtered current signals and said filtered motion signals to control the motion of said membrane.

3.) System according to claim 2,

wherein said first filtering means is a filter with substantially first order characteristic at the upper end of its passband,

and wherein said second filtering means is a filter with substantially first order characteristic at the lower end of its passband.

4.) System according to claim 3,

wherein the corner frequency at said upper end of passband of said first filtering means and the corner frequency of said lower end of passband of said second filtering means are substantially the same.

5.) System according to claim 4,

wherein said control means further comprises calculating means for combining the output signals of said filtering means by addition.

6.) System according to claim 2,

wherein said first filtering means is a lowpass filter with a transfer characteristic at its upper end of passband of substantially first order,

and wherein said second filtering means is a highpass filter with a transfer characteristic at its lower end of passband of substantially first order.

7.) System according to claim 6,

wherein the corner frequency of said lowpass filter and the corner frequency of said highpass filter are substantially the same.

8.) System according to claim 7,

wherein said control means further comprises calculating means for combining the output signals of said filtering means by addition.

9.) System according to claim 1,

wherein said amplifying means is a current source for controlling the current through said voice coil according to said steering signals received from the controlling means by using said current signals from the current sensing means.

10.) System according to claim 2,

wherein said amplifying means is a current source for controlling the current through said voice coil according to said steering signals received from the controlling means by using said current signals from the current sensing means.

11.) Method for controlling the motion of the membrane of an electrodynamic transducer, comprising the steps of:

a) measuring the motion of the membrane with motion measuring means and producing motion signals indicative of this motion,

b) measuring the currents through the voice coils of the transducer with current sensing means and producing current signals indicative of said currents,

c) using said motion signals to control the lower-frequency components of the motion of said membrane,

d) using said current signals to control the higher-frequency components of the motion of said membrane,

e) controlling said lower-frequency components and higher-frequency components by a controller.

What is claimed is:

1.) An electrodynamic transducer system with a motional feedback closed-loop control system for motion control of the transducers membrane, comprising

a) an electrodynamic transducer comprising a membrane and at least one voice-coil attached to the membrane,

b) motion sensing means for measuring the motion of said membrane and producing motion signals indicative of said motion,

c) current sensing means for measuring the currents flowing through said voice-coils and producing current signals indicative of said currents,

d) control means of the closed-loop type, receiving said motion signals and receiving said current signals, for controlling the motion of said membrane in accordance to at least one received setpoint signal by using said motion signals predominantly to control the spectral lower-frequency components of said membrane's motion and by using said current signals predominatly to control the spectral higher-frequency components of said membrane's motion, and for producing at least one steering signal,

e) amplifying means receiving said steering signals from said control means and for driving electrical currents through said voice-coils in reaction to said steering signals,

whereby by using said current signals and said motion signals said membrane's motion is controlled by said control means over a wide frequency range in accordance to said setpoint signals.

2.) System according to claim 1, further comprising

a) first filtering means receiving said motion signals for lowpass - filtering said motion signals generated by said motion sensing means and producing filtered motion signals, which are conveyed to said controlling means,

b) second filtering means receiving said current signals for highpass - filtering said current signals generated by said current sensing means and producing filtered current signals, which are conveyed to said controlling means,

wherein said control means use said filtered current signals and said filtered motion signals to control the motion of said membrane.

3.) System according to claim 2,

wherein said first filtering means is a filter with substantially first order characteristic at the upper end of its passband,

and wherein said second filtering means is a filter with substantially first order characteristic at the lower end of its passband.

4.) System according to claim 3,

wherein the corner frequency at said upper end of passband of said first filtering means and the corner frequency of said lower end of passband of said second filtering means are substantially the same.

5.) System according to claim 4,

wherein said control means further comprises calculating means for combining the output signals of said filtering means by addition.

6.) System according to claim 2,

wherein said first filtering means is a lowpass filter with a transfer characteristic at its upper end of passband of substantially first order,

and wherein said second filtering means is a highpass filter with a transfer characteristic at its lower end of passband of substantially first order.

7.) System according to claim 6,
wherein the corner frequency of said lowpass filter and the corner frequency of said highpass filter are substantially the same.

8.) System according to claim 7,
wherein said control means further comprises calculating means for combining the output signals of said filtering means by addition.

9.) System according to claim 1,
wherein said amplifying means is a current source for controlling the current through said voice coil according to said steering signals received from the controlling means by using said current signals from the current sensing means.

10.) System according to claim 2,
wherein said amplifying means is a current source for controlling the current through said voice coil according to said steering signals received from the controlling means by using said current signals from the current sensing means.

11.) Method for controlling the motion of the membrane of an electrodynamic transducer, comprising the steps of:
a) measuring the motion of the membrane with motion measuring means and producing motion signals indicative of this motion,
b) measuring the currents through the voice coils of the transducer with current sensing means and producing current signals indicative of said currents,
c) using said motion signals to control the lower-frequency components of the motion of said membrane,
d) using said current signals to control the higher-frequency components of the motion of said membrane,

e) controlling said lower-frequency components and higher-frequency components by a controller.